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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/720,658	11/24/2003	John Terry	042933/303048	4642

826 7590 11/16/2006

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EXAMINER	
DEAN, RAYMOND S	

ART UNIT	PAPER NUMBER
2618	

DATE MAILED: 11/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/720,658	TERRY ET AL.	
	Examiner	Art Unit	
	Raymond S. Dean	2618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 August 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 - 10, 12 - 23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 - 10, 12 - 23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1 and 16 have been considered but are moot in view of the new ground(s) of rejection.

Kadous (US 6,636,568) teaches wherein the first mapper transmits the first mapped values to a first antenna transducer among a plurality of antenna transducers and wherein the second mapper transmits the second mapped values to a second antenna transducer among the plurality of antenna transducers (See Figures 1, 5, Cols. 3 lines 59 – 67 (particularly lines 61 – 62), 4 lines 1 – 22, 15 lines 57 – 67, 16 lines 1 – 67, 17 lines 1 – 5), the first and second antenna transducers receive and transduce only the first mapped values and the second mapped values, respectively, into electromagnetic form for communication upon the communication channel (See Figures 1, 5, Cols. 3 lines 59 – 67 (particularly lines 61 – 62), 4 lines 1 – 22, 15 lines 57 – 67, 16 lines 1 – 67, 17 lines 1 – 5). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the MIMO system of Mantravadi with the MIMO architecture of Kadous for the purpose of determining data rates for multiple data streams to achieve high performance when limited information is available at the transmitter for a MIMO channel as taught by Kadous.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1 – 10, 16 – 17, and 21 – 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mantravadi et al. (US 2005/0068918) in view of Kadous (US 6,636,568).

Regarding Claims 1, 16, 21, Mantravadi teaches in a communication system having a sending station for sending communication data upon a communication channel susceptible to distortion (Figure 4A, the data will be transmitted over an RF channel, which is susceptible to distortion such as noise and fading), an improvement of apparatus for placing the communication data in a form to facilitate the communication thereof upon the communication channel, said apparatus comprising: a first mapper adapted to receive first representations of a first portion of the communication data (Figure 4A, Section 0005 lines 5 – 6, Section 0105, the modulator (416a) is the first mapper, the first portion of the communication data is the base data stream), said first mapper for mapping the first representations of the first portion of the communication data into first mapped values according to a first mapping scheme (Section 0105, the modulator (416a) can use a plurality of modulation/mapping schemes thus there will be a first mapping scheme); a second mapper adapted to

receive second representations of a second portion of the communication data (Figure 4A, Section 0106 lines 1 – 6, the modulator (416b) is the second mapper, the second portion of the communication data is the enhanced data stream), said second mapper for mapping the second representations of the communication data into second mapped values according to a second mapping scheme (Figure 4A, Section 0106 lines 1 – 6, the modulator (416b) can use a plurality of modulation/mapping schemes just like the first mapper (416a)), the second mapping scheme exhibiting a mapping property that differs with the first mapping scheme (Sections 0105, 0106 lines 1 – 6, the modulators (416a, 416b) can use a plurality of modulation/mapping schemes thus modulator (416a) can use a modulation/mapping scheme that differs from the modulation/mapping scheme of modulator (416b)).

Mantravadi does not teach wherein the first mapper transmits the first mapped values to a first antenna transducer among a plurality of antenna transducers and wherein the second mapper transmits the second mapped values to a second antenna transducer among the plurality of antenna transducers, the first and second antenna transducers receive and transduce only the first mapped values and the second mapped values, respectively, into electromagnetic form for communication upon the communication channel.

Kadous teaches wherein the first mapper transmits the first mapped values to a first antenna transducer among a plurality of antenna transducers and wherein the second mapper transmits the second mapped values to a second antenna transducer among the plurality of antenna transducers (See Figures 1, 5, Cols. 3 lines 59 – 67

(particularly lines 61 – 62), 4 lines 1 – 22, 15 lines 57 – 67, 16 lines 1 – 67, 17 lines 1 – 5), the first and second antenna transducers receive and transduce only the first mapped values and the second mapped values, respectively, into electromagnetic form for communication upon the communication channel (See Figures 1, 5, Cols. 3 lines 59 – 67 (particularly lines 61 – 62), 4 lines 1 – 22, 15 lines 57 – 67, 16 lines 1 – 67, 17 lines 1 – 5).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the MIMO system of Mantravadi with the MIMO architecture of Kadous for the purpose of determining data rates for multiple data streams to achieve high performance when limited information is available at the transmitter for a MIMO channel as taught by Kadous.

Regarding Claims 2, 22, Mantravadi in view of Kadous teaches all of the claimed limitations recited in Claims 1, 21. Mantravadi further teaches a first encoder adapted to receive the first portion of the communication data, said first encoder for encoding the first portion of the communication data according to a first encoding techniques (Figure 4A, first encoder (412a), Section 0105, said encoder can use a plurality of encoding techniques) and wherein the first representations of the first portion of the communication data to which said first mapper is adapted to receive comprise first-encoded values formed by said first encoder (Figure 4A, Section 0105).

Regarding Claims 3, 23, Mantravadi in view of Kadous teaches all of the claimed limitations recited in Claims 1, 21. Mantravadi further teaches a second encoder adapted to receive the second portion of the communication data, said second encoder

for encoding the second portion of the communication data according to a second encoding technique (Figure 4A, second encoder (412b), Section 0106 lines 1 – 6, said encoder can use a plurality of encoding techniques just like first encoder (412a)) and wherein the second representations of the second portion of the communication data to which said second mapper is adapted to receive comprise second-encoded values formed by said second encoder (Figure 4A, Section 0106 lines 1 – 6).

Regarding Claim 4, Mantravadi in view of Kadous teaches all of the claimed limitations recited in Claim 1. Mantravadi further teaches wherein the first mapped values into which said first mapper maps the first representations of the first portion of the communication data comprises a first set of mapped values, wherein the second mapped values into which said second mapper maps the second representations of the second portion of the communication data comprise a second set of mapped values, elements of the first set of mapped values differing in value with elements of the second set of mapped values (Sections 0105, 0106 lines 1 – 6, the modulators (416a, 416b) can use a plurality of modulation/mapping schemes thus modulator (416a) can use a modulation/mapping scheme that differs from the modulation/mapping scheme of modulator (416b), since the mapping schemes differ the elements of the mapped values for each scheme will differ in value).

Regarding Claim 5, Mantravadi in view of Kadous teaches all of the claimed limitations recited in Claim 4. Mantravadi further teaches wherein the first set of mapped values and the second set of mapped values formed by said first mapper and said second mapper, respectively, are formed of mutually-exclusive elements (Sections

0105, 0106 lines 1 – 6, since the mapping schemes differ the elements of the mapped values for each scheme will differ in value and will be mutually-exclusive).

Regarding Claim 6, Mantravadi in view of Kadous teaches all of the claimed limitations recited in Claim 4. Mantravadi further teaches wherein the mapping property exhibited by the second mapping scheme that differs with that of the first mapping scheme comprises vector magnitudes that differ (Sections 0105, 0106 lines 1 – 6, the modulators (416a, 416b) can use a plurality of modulation/mapping schemes thus modulator (416a) can use a modulation/mapping scheme that differs from the modulation/mapping scheme of modulator (416b), said modulation schemes will have differing constellations and thus differing vector magnitudes).

Regarding Claim 7, Mantravadi in view of Kadous teaches all of the claimed limitations recited in Claim 1. Mantravadi further teaches wherein the first mapped values into which said first mapper maps the first representations of the first portion of the communication data comprise a first set of mapped values that exhibits first geometric differences there between, wherein the second mapped values into which said second representations of the second portion of the communication data comprise a second set of map values that exhibit second geometric differences there between (Sections 0105, 0106 lines 1 – 6, the modulators (416a, 416b) can use a plurality of modulation/mapping schemes thus modulator (416a) can use a modulation/mapping scheme that differs from the modulation/mapping scheme of modulator (416b), said modulation schemes will have differing constellations and thus differing vector magnitudes, since the constellations differ the geometric differences between the

values or states of the first constellation will differ from the geometric differences between the values or states of the second constellation).

Regarding Claim 8, Mantravadi in view of Kadous teaches all of the claimed limitations recited in Claim 7. Mantravadi further teaches wherein the first geometric differences between the mapped values of the first set and the second geometric differences between the mapped values of the second set are mutually exclusive (Sections 0105, 0106 lines 1 – 6, since the constellations differ the geometric differences between the values or states of the first constellation will differ from the geometric differences between the values or states of the second constellation, since said geometric differences are associated with mapped values that are mutually exclusive the geometric differences will be mutually exclusive).

Regarding Claim 9, Mantravadi in view of Kadous teaches all of the claimed limitations recited in Claim 7. Mantravadi further teaches wherein the mapping property exhibited by the second mapping scheme that differs with that of the first mapping scheme comprises second geometric differences that differ in lengths with lengths of the first geometric differences (Section 0105, 0106 lines 1 – 6, since the constellations differ the geometric differences between the values or states of the first constellation will differ from the geometric differences between the values or states of the second constellation, said geometric properties comprise lengths thus the lengths will differ).

Regarding Claim 10, Mantravadi in view of Kadous teaches all of the claimed limitations recited in Claim 1. Mantravadi further teaches wherein the mapping by

which said first mapper maps the first representations and the mapping by which said second mapper maps the second representations are together selected to define a layered code having combined values that are applied to a respective one of the plurality of antenna transducers (Figure 4A, Section 0111 lines 10 – 19, the coded data will be combined via the combiner).

Regarding Claim 17, Mantravadi in view of Kadous teaches all of the claimed limitations recited in Claim 16. Mantravadi further teaches transducing the selected first mapped values and the selected second mapped values applied during said operation of selectably applying into electromagnetic form and delivering, by way of the communication channel, the selected first and second mapped values, respectively, to the receiving station (Figures 4A, 8A).

4. Claims 12 – 15 and 18 – 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mantravadi et al. (US 2005/0068918) in view of Kadous (US 6,636,568), as applied to Claims 1, 17 above, and further in view of Ketchum (US 6,731,668).

Regarding Claims 12, 18, Mantravadi in view of Kadous teaches all of the claimed limitations recited in Claims 1, 17. Mantravadi further teaches a receiving station for receiving the communication data once communicated upon the communication channel (Figures 8A, 8B), a further improvement of apparatus for the receiving station for facilitating detection of the communication data, said apparatus comprising: a decoder, which exploits the difference in mapping properties between the

first and second set (Figure 8A, the decoder (836a) decodes the first set), adapted to receive indications of the communication data communicated upon the communication channel and delivered to the receiving station (Figure 8A).

Mantravadi in view of Kadous does not teach a maximum likelihood decoder, which exploits the difference in mapping properties between the first and second set, adapted to receive indications of the communication data communicated upon the communication channel and delivered to the receiving station, said maximum likelihood decoder for determining a maximum likelihood path that defines selection of values of the communication data, the maximum likelihood path selected from amongst a set of possible paths, each defining communication data value possibilities.

Ketchum teaches a maximum likelihood decoder for determining a maximum likelihood path that defines selection of values of the communication data, the maximum likelihood path selected from amongst a set of possible paths, each defining communication data value possibilities (Column 3 lines 19 – 26, Column 8 lines 45 – 60).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the receiver of Mantravadi in view of Kadous with the Viterbi decoder of Ketchum as an alternative means of decoding a received signal thus providing an information sequence with a minimal number of errors as taught by Ketchum.

Regarding Claim 13, Mantravadi in view of Kadous and in further view of Ketchum teaches all of the claimed limitations recited in Claim 12. Ketchum further

teaches wherein the set of possible paths from amongst which said maximum likelihood decoder selects the maximum likelihood path comprises fewer than all of the possible paths (Column 3 lines 19 – 26).

Regarding Claims 14, 20, Mantravadi in view of Kadous and in further view of Ketchum teaches all of the claimed limitations recited in Claims 12, 19. Ketchum further teaches wherein the set of possible paths from amongst which said maximum likelihood decoder selects the maximum likelihood path is selected responsive to a mapping scheme pursuant to which a mapper maps representations (Column 3 lines 19 – 26). Mantravadi further teaches a first and second mapping scheme (Sections 0105, 0106 lines 1 – 6).

Regarding Claims 15, Mantravadi in view of Kadous and in further view of Ketchum teaches all of the claimed limitations recited in Claims 14. Ketchum further teaches wherein the set of possible paths from amongst which said maximum likelihood decoder selects the maximum likelihood path is selected responsive to a mapping scheme pursuant to which a mapper maps representations (Column 3 lines 19 – 26). Mantravadi further teaches a first and second mapping scheme (Sections 0105, 0106 lines 1 – 6).

Regarding Claim 19, Mantravadi in view of Kadous and in further view of Ketchum teaches all of the claimed limitations recited in Claim 18. Ketchum further teaches prior to said operation of decoding, of selecting the set of possible paths from which the maximum likelihood path is formable (Column 3 lines 19 – 26).

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond S. Dean whose telephone number is 571-272-7877. The examiner can normally be reached on Monday-Friday 6:00-2:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward F. Urban can be reached on 571-272-7899. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Raymond S. Dean
November 1, 2006

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